Ontario

A Dairy Farm Example:

Expanding Your Livestock Operation Under the Nutrient Management Act, 2002

Ministry of Agriculture and Food
Publication 822

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Introduction

This booklet is part of a series of livestock information books developed to help farmers understand the implications of the *Nutrient Management Act*, 2002. The *Nutrient Management Act*, 2002 was passed in 2002 and the Ontario Regulation (O. Reg.) 267/03 was enacted in 2003. The *Act* addresses how nutrients, including manure, are managed while they are stored and applied to farmland for the purpose of growing agricultural crops.

For more information, or to see all of the titles in this series, visit the OMAF Web site at **www.omaf.gov.on.ca** or call the Agricultural Information Contact Centre at 1-877-424-1300.

For more information on provincial Acts and Regulations, visit the Ontario Statutes and Regulations Web site at **www.e-laws.gov.on.ca**

The farm operation information used in this booklet is not based on any existing farming operation and is for demonstration purposes only.

Some Common Acronyms

The *Nutrient Management Act,* 2002 brought with it new terms that have quickly become common, and are usually abbreviated. These include:

Minimum Separation Distance	MSD
Nutrient Management Act, 2002	*NMA* or *Act*
Nutrient Management Strategy	NMS
Nutrient Management Plan	NMP
Nutrient Unit	NU
Nutrient Management Act, 2002 General Regulation	O. Reg. 267/03 or the Regulation

Farmers planning to apply for a building permit for a livestock barn and/or permanent manure storage, and those with large operations, need to be aware of the recent nutrient management legislation. This booklet reviews two key documents – the Nutrient Management Strategy (NMS) and the Nutrient Management Plan (NMP) – and the requirements that must be met in order to obtain approval of the NMS and/or NMP (NMS/P). An approved NMS/P will assist the agricultural operator in managing nutrients in a way that will be environmentally friendly and economically viable. An approved NMS/P can be used in the process of obtaining a building permit for a new or expanding nutrient storage facility. Many of the requirements in the regulation do not come into force until the farmer is required to have an NMS or NMP.

Nutrient Units and Compliance Schedule

All farms are now affected by the *NMA*. The Regulation includes three items that affect all farms. The remainder of the Regulation will be applied to farms as they are phased in. Phase-in dates vary for agricultural operations based on their size. The size of the agricultural operation is determined by the number of nutrient units (NUs) on that agricultural operation. An NU is defined as having the fertilizer equivalent of 43 kg of nitrogen or 55 kg of phosphorus (whichever is lower). NUs were created to enable the fair comparison of various nutrient types including agricultural, non-agricultural and commercial products (in essence an apples-to-apples comparison). A farm is defined as land no smaller than a single deed that meets the requirements of Section 5 of the Regulation.

The table below provides examples of the number of animals needed to make one NU. This chart can also be found in O. Reg. 267/03, as amended in the Nutrient Management Protocol, Part 3, Table 3.2.1.

Number of animals per Nutrient Unit on Farm Units Generating Manure

Type of Animal (based on highest design capacity of a new barn on the farm unit at one time)	# Animals per NU
Dairy cow (large-frame, 1200-1400 lbs, milking or dry, such as Holsteins)	0.7
Dairy heifers (large-frame, 400-1200 lbs such as Holsteins)	2.0
Dairy calves (large-frame, 100-400 lbs, such as Holsteins)	6.0
* Dairy cow (large-frame, 1200-1400 lbs, milking or dry (Holsteins); includes calves/heifers)	*0.55
Dairy cow (medium-frame, 1000-1200 lbs, milking or dry, such as Guernseys)	0.85

Dairy heifers (medium-frame, 325-1000 lbs, such as Guernseys)	2.4
Dairy calves (medium-frame, 85-325 lbs, such as Guernseys)	7.0
* Dairy cow (medium-frame, 1000-1200 lbs, milking or dry (Guernseys); includes calves/heifers)	*0.66
Dairy cow (small-frame, 800-1000 lbs, milking or dry, such as Jerseys)	1.0
Dairy heifers (small-frame, 275-800 lbs, such as Jerseys)	2.9
Dairy calves (small-frame, 65-275 lbs, such as Jerseys)	8.5
*Dairy cow (small-frame, 800-1000 lbs, milking or dry (Jerseys); includes calves/heifers)	*0.77
Beef cows (includes unweaned calf and replacements)	1.0
Beef shortkeepers (900-1300 lbs)	2.0
Beef backgrounders (575-900 lbs)	3.0
Beef feeders (575-1250 lbs)	3.0
SEW (Segregated Early Weaning) Sows (lactating-aged sows, includes weaners to 15 lbs)	3.33
SEW weaners (15-60 lbs)	20.0
Sow farrow-wean (lactating-aged sows, includes weaners to 60 lbs)	2.5
Finishing pigs (60-230 lbs)	6.0
Horses, large-framed (mature at >1500 lbs; includes unweaned foal)	0.7
Horses, medium-framed (mature at 500 - 1500 lbs; includes unweaned foal)	1.0
Horses, small-framed (mature at < 500 lbs; includes unweaned foal)	2.0
Laying hens (after 2.9 lbs pullet stage, until end of laying period at about 3.75 lbs)	150
Layer pullets (day-old pullets placed, raised to 2.9 lbs)	500
Chicken broilers, floor growing area (total square feet, regardless of quota cycle, or finishing weight)	267 sq. ft.
Turkey broiler/hen/tom growing space (total square feet, regardless of finishing weight)	267 sq. ft.
Chicken broiler breeder growers (females and males transferred out to layer barn)	300
Chicken broiler breeder layers (females and males transferred in from grower barn)	100
Sheep, breeding-aged ewes (sheep raised for meat production; includes lambs, replacements and rams)	8.0
Feeder lambs, 70 to 125 lbs	20.0
Sheep, milking-aged ewes (sheep raised for milk production; includes lambs, replacements and rams)	6.0

Goats, milking-aged goats (goats raised for milk production; includes kids, replacements and bucks)	8.0
Milk-fed, or grain-fed veal calves	6.0
NOTE: For animals not listed on the chart above, the number of animals per nutrient unit can be calculated by determining the number of animals that will produce the amount of nutrients that give the fertilizer replacement value of the lower of 43 kilograms of nitrogen or 55 kilograms of phosphate as nutrient.	

**It should be noted that for 100 Holstein milking and dry cows in a herd on the same farm unit, divide by 0.55 cows per Nutrient Unit to obtain 182 Nutrient Units for the entire herd including calves and heifers. If housed on separate farm units, do separate calculations, using the individual number of cows, heifers or calves per Nutrient Unit. There could be very slight discrepancies in the resulting number of NU because of the rounding of numbers.*

Reference: Nutrient Management Protocols, Table 3-1, page 12.
Keep in mind that NU are based on the barn capacity and not on the number of livestock produced per year.

Nutrient Management Strategy and Nutrient Management Plan

The focus of the new *Act* is the requirement for a NMS/P.

A NMS describes the generation, storage and destination of the nutrients produced. Essentially, in completing a NMS, farmers answer the questions "How much manure is being produced?", "How is the manure stored" and "Where is the manure to go?" People who own or control a livestock operation that has been phased-in must complete a NMS.

A NMP determines the details of how the generated nutrients (i.e., manure) are to be applied to a given land base. The NMP optimizes the application of nutrients to crops and enhances protection for ground and surface water.

All farm units that generate nutrients and apply those nutrients to the land must submit a NMS/P once the farm unit has been phased-in to the *NMA*.

A NMP determines the rate and timing of application of manure based on a number of different factors. These factors include:

- existing soil nutrient levels as determined through soil testing at an OMAF-accredited lab
- nutrient content of the manure as determined through testing or book values
- crops to be grown in the next five years
- crops grown on the land in the past year
- soil type and slope of the land
- tillage practices used
- method and timing of manure application
- manure applications over the past three years
- proximity to surface water, including wells

What to Expect

The NMS/P require information regarding the operation and its management. Key components are listed in the next chart. Many of these components are common to both documents.

Category	Component	Considerations in a Plan or Strategy	
		Strategy	Plan
Operation Information	Description of the Operation	Yes	Yes
	Agreements (i.e. land rental, broker)	Yes	Yes
For Farm Units	Farm Unit Declaration Form	Yes	Yes
	Farm Unit Sketch	Yes	Yes
Inventory and Description of Prescribed Materials	List of Prescribed Materials Generated and Received	Yes	Yes
	Analysis of Nutrient Content	Yes	Yes
Destination and Storage	Destinations	Yes	No
	Storage Facilities	Yes	Yes
Contingency Plan	Contingency Plan	Yes	Yes
Sign-off Form	Sign-off Form	Yes	Yes
Field Information	Field Properties	No	Yes
	Field Sketches	No	Yes
	Soil Samples and Analysis	No	Yes
Crop Information	Crop Rotation and Yields	No	Yes
	Tillage Practices	No	Yes
Nutrient Application Information	Commercial Fertilizer Application	No	Yes
	Previous Manure Applications (last 3 years)	No	Yes
	Application of Prescribed Materials	No	Yes
	Agronomic and Crop Removal Balance for Nitrogen	No	Yes
	Nitrogen Index	No	Yes
	Agronomic and Crop Removal for Phosphorous	No	Yes
	Phosphorous Index	No	Yes
	Common Land Application Setbacks/Limits	No	Yes
	Demonstration of Adequate Land Base	No	Yes

Nutrient Management Protocols: Table 4.4.1, page 20.

Completion of the NMS and NMP

There are two ways to complete a NMS/P. You can either complete the documents yourself or hire a certified consultant. The person who completes the plan will need provincial certification.

Do It Yourself

There are two tools that can help you complete a NMS/P.

- NMAN Software – a computer program developed by the Ontario Ministry of Agriculture and Food (OMAF) that contains all of the forms and calculations necessary for a complete NMS/P, with the exception of the required sketches. The NMAN program is relatively straightforward and OMAF offers a training course on how to operate the software. In addition, OMAF staff can provide some technical support.
- NMAN Workbook – a paper version of the key elements of the NMAN program. OMAF offers a training course on the theory and science behind NMAN and the NMAN workbook with an opportunity to use this tool. The software does provide greater detail in some areas.

To complete your NMS and/or NMP, you will need some additional forms as identified in the preceding chart (e.g., Farm Unit Declaration).

Farmers who choose to do their own NMS/P must obtain one of the following certificates:

Certificate Title	For	Timeline
Agricultural Operation Planning Certificate	New operations ≥150 NUs and operations that otherwise need approval (see section 101) Expanding operations ≥300 NUs	Dec. 31, 2005
Agricultural Operation Simplified Planning Certificate	New operations >5 to <150 NUs that don't otherwise need an approved NMS or NMP	Dec. 31, 2007

A list of the necessary courses, dates and locations are available by calling the Agricultural Information Contact Centre (AICC) at 1-877-424-1300 or from the OMAF Web site at **www.omaf.gov.on.ca**

Hire a Consultant

Many farmers hire consultants to complete their NMS/P on a fee-for-service basis. Anyone completing plans and strategies for others must be certified by OMAF. A list of consultants that are certified by OMAF can be obtained by contacting the AICC at 1-877-424-1300 or from the OMAF Web site at **www.omaf.gov.on.ca**

Consultant fees will vary, depending on the complexity of the situation and the acreage involved. Plans must be renewed every five years.

If events listed in section 22 or 26 of the Regulation occur to the operation prior to the five-year mark, (e.g., more livestock, fewer acres available for spreading, new manure storage system), then the NMS/P must be updated. Minor changes to a strategy or plan (e.g., fall spreading versus

spring spreading) must be documented and require the farm operator to update the NMS/P to ensure the appropriate utilization of the manure.

Regardless of who completes the NMS/P, it is the responsibility of the farmer to ensure that the NMS/P is implemented and that all nutrient application activities are documented.

Planning for the expansion or upgrading of a farm operation can also include a number of important business planning and financial management decisions. The Canadian Farm Business Advisory Service provides low cost access to qualified independent business management consultants who can help you assess the financial performance of your current operation, consider your business options, and develop a full set of projections for any planned changes.

The Canadian Farm Business Advisory Service has 3 program components:

The Farm Business Assessment provides up to 5 days of consultation with a qualified farm business advisor to assess your current business, looking at your business planning options, and develop financial projections for the changes and option you are considering. Eligible producers can access this service for a nominal fee of $100. A list of qualified advisors providing this service in your area is available by contacting Canadian Agri-Renewal Services at the telephone number below.

The second component, Specialized Business Planning Services, is available to producers who require a more specialized business plan for a major business change – such as an expansion plan or farm succession plan. This program offers government assistance of up to 50%, to a maximum of $8,000, to help offset the cost of hiring qualified consulting services.

The third component, Planning and Assessment for Value Added Enterprises, focuses specifically on assessing the feasibility and business planning needed before establishing or expanding ventures designed to add value to agricultural products. This program also provides assistance of up to 50% of the cost of consulting services – to a maximum of up to $10,000 per producer.

Information on any of these business planning services is available by calling Canadian Agri-Renewal Services toll free at 1-866-452-5558. Producers in Northern Ontario can call 1-800-461-6132.

Phase-in Periods

Livestock farms will be required to comply with the *NMA* as per the following schedule:

Size of Operation (in NU)	Phase-in	NMS/NMP Requirement	OMAF Approval Required
≤5	Not affected	Not required	No
New operations >5 and <150	Sept. 30, 2003	May be required for municipal bylaws	No, but OMAF will conduct third-party review of plans
New operations ≥150	Sept. 30, 2003	To comply with regulations	Yes
Operations expanding to ≥300	Sept. 30, 2003	To comply with regulations	Yes
Existing operations ≥300	July 2005	To comply with regulations	Yes

O. Reg. 267/03 as amended, S.11

When submitting a plan, allow sufficient time for data collection, NMS/P preparation, review and approval. Errors in the NMS/P can result in the NMS/P being returned for clarification or correction and can cause delays in the approval process, thus extending the approval time. Keep in mind that some municipalities may require a NMS/P for farms not covered by the Regulation. It is important to check with your municipality to determine whether there are additional requirements that must be met.

Building Permits for Phased-in Farms

The *NMA* outlines criteria that must be met for building new permanent manure storage facilities. While the *NMA*, Reg & Protocols outlines the criteria that must be met before a building permit is issued for a new permanent manure storage facility, there are additional requirements that you must also follow to satisfy the *Ontario Building Code, 1992*.

Engineered Plans and Construction Supervision

Once operations are required to have a NMS/P, standards under the Regulation, apply for the construction or expansion of permanent nutrient storage facilities. These include external permanent manure storage facilities and in-floor storage structures in the barn. The Regulation requires these facilities to be designed and their construction supervised by a professional engineer. The only exception is solid manure storages with a floor area of less than 600 m^2 and walls less than 1.0 m high. To obtain a building permit for a permanent liquid nutrient storage facility or a permanent solid nutrient storage facility ≥300 NUs and without a concrete floor, the engineer must submit a site plan, a geotechnical investigation report and detailed construction drawings. The engineer is responsible for inspection during the period of construction.

How does the *Nutrient Management Act, 2002,* affect farmers?

Site Plan

According to the *NMA*, a minimum distance must be maintained between the manure storage facility and various water sources.

Minimum Distance between the Permanent Manure Storage and:	Distance (metres)
A drilled well (>15 metres deep)	15
A municipal well	100
Other wells (dug, bored)	30 (90 if the facility will store non-agricultural source materials)
Surface water	50 (as measured along the flow path)
Field drainage tiles	15
A flood plain	No building within the 100-year flood line*

** Unless a permit has been obtained under Section 28 of the Conservation Authorities Act*

Surface water includes ponds, wetlands, lakes, rivers, creeks or artificial channels that support aquatic-type plants. A grassed waterway for erosion control is not considered surface water (see section 2.(1) and (2) in the Regulation for clarification).

The distance is measured from the permanent manure storage facility to the top of the bank, of surface water.

Minimum Distance Separation (MDS II) for Odours

The MDS formulas establish an appropriate distance separation between livestock barns, permanent manure storage facilities and neighbours. These are currently part of provincial land use policy. They are not a requirement of the Regulation. Most municipalities have incorporated these guidelines into their zoning bylaws. In these cases, the MDS II distances will have to be met before a building permit is issued. The municipality can provide you with the necessary MDS II calculations based on information you supply.

Site Characterization

A professional engineer or geoscientist must complete a site characterization for a construction or expansion of a permanent liquid nutrient storage facility or a solid permanent nutrient storage facility ≥300 NUs without a concrete floor. The site characterization establishes the hydrogeologic characteristics of the soil and the depth to the groundwater or bedrock. The soil characterization may be done by a lab analysis of a soil sample, an on-site test, or, if the soil is very heavy, a visual assessment by a professional. The results of this investigation will determine the design criteria for a permanent manure storage facility.

This chart shows under which circumstances these options must be used.

	Soil Conditions Required between the Tank Bottom and the Bedrock or Aquifer	Tank Design Details
1	• 1.0 m of hydraulically secure soil* or • 1.0 m of soil with more than 15% clay	• Unlined tank, unreinforced floor
2	• 0.5 m of hydraulically secure soil* or • 1.0 m of soil with at least 10% clay	• Unlined tank, reinforced floor
3	• 1.0 m of native undisturbed material or • 1.0 m of compacted granular material	• Lined tank, unreinforced floor
4	• 0.5 m of native undisturbed material • 0.5 m of compacted granular material	• Lined tank, reinforced floor

**one having a maximum saturated hydraulic conductivity of 1 x 10^{-8} metres per second. This is determined by a lab test of the soil. It is roughly equivalent to a soil with at least a 20% clay content.*

Reinforcing the floor or lining the excavation is costly. Farmers should also consider moving the storage to a more suitable location.

Construction Drawings

Detailed construction drawings of the manure storage (concrete, steel or earthen) and of liquid manure transfer systems are to be provided by a professional engineer. The Regulation and incorporated protocol lists specific design requirements that must be met.

Storage Capacity

The Regulation requires a minimum of 240 days of nutrient storage capacity, which can be comprised of:

- the capacity of the storage, less an allowance for accumulated precipitation (for open-top structures) and a 0.3 m freeboard at the top
- temporary storage of manure in the field (solid manure only)
- off-site or off-farm storage capacity if it is identified in the NMS/P

The MSTOR computer program can determine the required manure storage volume. It is part of the NMAN program.

Options for periods less than 240 days are provided for situations described in the Regulation (e.g., NMS, NMP, broker, animals inside for part of year).

When expanding nutrient storage, farmers may decide to:

- add enough storage to take the expanded operation up to 240 days of storage as per the minimum requirement, or
- build larger (e.g., up to a full year of storage)

A larger tank gives more flexibility and options for spreading times. This can be an advantage under the following situations:

- **wet conditions in fall** – severely restrict spreading opportunities. When followed by a wet spring, this can lead to tanks overflowing when storage capacity is borderline.
- **light soils (e.g., sandy loam)** – as calculated in NMAN, the nitrogen index may require that spreading be delayed until cooler fall weather, in order to retard the conversion of ammonium to nitrate and reduce the risk of groundwater contamination. If this is the case, 240 days of storage may be insufficient.
- **circular manure tanks** – the extra storage can prove less costly, as a large economy of scale applies to circular manure tanks.

Consider whether the benefits of increased storage capacity outweigh the added capital cost.

Manure Transfer Systems

On phased-in farms, the pipes and the connectors used to drain pits and transfer the manure to long-term storage must now use gasketed fittings.

Manure Application Issues

There are several considerations that will affect the location of land available for manure application. A reduction in manure application rates may be caused by the buffer zones next to surface water or dug, drilled or municipal wells. The municipality may require additional setbacks to those required by the *NMA*.

Buffer Zones

A vegetated buffer zone of at least 3 m width must be established next to any top of bank of surface water such as a lake, pond, ditch or creek that supports aquatic-type plants. This does not apply to a grassed waterway or a roadside ditch that has no stream. Within 10 m of this buffer strip, the manure will have to be injected or incorporated within 24 hours unless there is a living crop or at least 30% crop residue.

Water Wells

Manure, non-agricultural source materials and fertilizers are not to be applied closer than the distances shown below:

Well Type	Setbacks for Ag. Source Materials	Setbacks for Non-Ag Source Materials	Setbacks for Commercial Fertilizer/Compost
Municipal well	100 m	100 m	100 m
Drilled well*	15 m	15 m	3 m
Other wells	30 m	90 m	3 m

** Drilled well refers to a well with a minimum depth of 15 m, and a continuous watertight casing with a minimum depth of 6 m. Wells that meet these criteria are normally, but not necessarily, drilled.*This example describes the planning and considerations that Ross Johnson undertook after making the business and family decision to expand his dairy operation from 100 to 200 milking cows. Expanding his herd means he will have to comply with the Nutrient Management Act, 2002, and the Regulations.

Summary of Farm Operation:

Present Operation:

Milking Herd Size: 100 milking Holsteins
Replacements: Heifers and calves raised on farm
Manure System: Cows and calves are on a liquid manure system and the heifers are on a bedded pack solid manure system
Manure Storage Capacity: 240 days of storage
Land Base: 197.2 ha (487 acres); 185.5 ha (458 workable) over three properties
Two barns exist on the farm:

- a 100 stall free-stall barn: 116 ft. x 92 ft.
- an older tie-stall barn: 150 ft. x 60 ft.

Proposed Expansion:

- Increase milking herd to 200 cows, continue to raise replacement animals
- Build new free-stall barn near existing barns
- Maintain existing barns with bedded packs for heifers and dry cows
- Build new manure storage to maintain minimum of 240 days of storage

How does the *Nutrient Management Act, 2002,* Apply to this Farm?

Ross knows that the size of a livestock farm and whether it is a new or an expanding operation determines whether or not the farm will need a provincially approved NMS/P. It may also determine if the farm is subject to a number of other requirements.

Ross calculated how many NU his farm has now and how many it would have after he expands. Dairy farmers with large-framed animals like Holsteins can convert the number of cows to NU (when they keep replacements on the farm) by dividing the number of cows by 0.55. The results from Ross's calculations were as follows:

	Conversion Factor	Total Nutrient Units
Present Operation	100/0.55	182 NU
Expanded Operation	200/0.55	364 NU

Because Ross's expanded operation will be 300 nutrient units or more, Ross knows that he will need to have a provincially approved Nutrient Management Strategy (NMS) and Nutrient Management Plan (NMP) to get his building permit.

An important result of completing the NMS/P will be the calculation of the amount of land required for manure application. This calculation will depend on several factors, including:

- the soil fertility levels, determined through soil testing at an OMAF accredited lab
- the nutrient content of the manure, determined through testing at an OMAF accredited lab or by using book values
- the crops to be grown in the next five years
- the crops grown in the past year
- the hydrologic soil group and slope of the land
- tillage practices used

- the method and timing of manure application
- manure application over the past three years
- proximity to surface water

Completing the NMS/P

Ross contacts OMAF to determine his options for completing his NMS and NMP and what land he needs to include in his farm unit. They could be completed by hand using the "Nutrient Management Workbook," by computer using the NMAN software, or by hiring a private consultant who will use NMAN. Ross decides to hire a consultant to save him time, both in terms of completing the actual plan, and in terms of not having to take the training required to be certified to submit a plan for approval. After talking to some other farmers, he contacted several consultants and asked each specifically about their experience, cost, the specific services they would provide, and to ensure that they were certified by OMAF.

Municipal Requirements

Ross then meets with his municipal building inspector to discuss his building plans. He learns that a number of items will be required by his particular municipality. Before obtaining a building permit he needs the following information:

- Minimum Distance Separation II requirements (MDSII)
- Site Characterization Study for groundwater protection
- Siting restrictions for surface water protection
- Engineered plans
- Construction supervision and inspection

Minimum Distance Separation II (MDSII)

MDSI and MDSII are not requirements of the NMA. However, as in most municipalities in Ontario, the local zoning bylaw requires Ross to site his new barn according to the Minimum Distance Separation II formula. The municipal officials or Ross's certified consultant completed the calculations for Ross based on the information he supplied. Distances calculated from Ross's preferred site:

Neighbouring Land Use	Building	Manure Storage
Nearest neighbour's dwelling	230.9 m (757 ft.)	280.3 m (919 ft.)
Areas zoned or designated Agriculturally Related Commercial Use, Passive Recreational, or Industrial	230.9 m (757 ft.)	280.3 m (919 ft.)
Areas zoned or designated Residential, Institutional, Active Recreational, or Commercial Urban Area	461.5 m (1513 ft.)	560.6 m (1838 ft.)
Nearest side or rear lot line	46.1 m (151 ft.)	56.1m (184 ft.)
Nearest road allowance (side or front lot line)	57.6 m (189 ft.)	70.2 m (230 ft.)

Site Characterization

The Regulation requires an engineer or geoscientist to complete a site characterization of the soils and groundwater table near or around the area adjacent to the proposed permanent liquid nutrient storage facility (or permanent solid nutrient storage facility with an earthen floor). This will determine the design parameters to be followed for the manure storage and gutters in the barn.

Once the site characterization is completed, the storage (or barn with storage) design can proceed. Ross has two options for obtaining building plans. The first option would be to hire a builder who has a set of engineered drawings that can be modified to meet his needs. The second option would be to hire an engineer to do the barn plans and then send out tenders to a number of contractors for bids on the project.

Manure Storage Capacity

The existing 110 ft. diameter x 12 ft. deep manure tank has provided 240 days of storage in the past. The Regulation requires a minimum of 240 days of storage. Ross will need to maintain his minimum 240 days of storage capacity with the additional number of cows.

His options are to build a new manure storage tank to hold all the liquid manure or to build a smaller storage tank and use a system that allows manure transfer between the new barn and the new and old manure storage tanks. Building the smaller tank and having manure transfer would save Ross approximately $40,000 compared to building a larger storage tank. Ross decided that the larger unit was worth the extra money because it would facilitate further expansion later on. He chose straw as the bedding type, although the building contractor also provided a feasible option for sand bedding.

The bedded packs for calves, heifers, and dry cows were projected to have 50% of manure as solid in the pack itself, and 50% of manure as liquid in the scrape alley. Liquid manure from the old tie-stall barn is scraped to a gutter cleaner that empties into a pump, that then empties into the long term liquid manure storage.

Spreading Restrictions

Ross reviewed the NMP prepared by his consultant and noted some restrictions that will reduce the amount of land that is available for manure application. The spreading limitations are specific to the features of Ross's fields, the method of manure application used and the composition of the manure.

Buffer Zones

Ross has two tributaries to the Thames River located on his farms. One is on the Home Farm and the other is on the New Farm. A small pond is located on the Simpson Farm as well. These are all illustrated in Appendix B. The necessary setback distances were determined by the NMAN program. A vegetative buffer zone of 3 m (10 ft.) must be established next to any surface water that supports aquatic-type plants. This does not, for example, apply to a grassed waterway or a roadside ditch that has no stream. Ross will not spread any manure within the remainder of the setback areas.

Water Wells

Ross has a drilled well on the Home Farm. Because of this, the sections of the Regulation related to water wells apply to his NMS/P. No manure may be applied within 15 m (50 ft.) of a drilled well.

Method of Application

In the past, Ross used his own high-trajectory irrigation gun to spread the manure. These systems are no longer allowed under the NMA Regulation, except in cases where they are used to apply material that is less than 1% dry matter. Ross decided to convert his manure application system to a drag-hose type to use some of his existing equipment and reduce the cost of going to an entirely new application method. He plans to use a rear-discharge solid manure spreader for the manure from the bedded packs.

Dairy Management Options

The amount of phosphorus in the manure is the main limitation for manure application. This is the situation with most dairy farms.

It is possible to achieve significant reductions in the amount of nitrogen and phosphorus that dairy cows excrete in their manure. Some methods of achieving these reductions are to:

- test forage regularly to ensure accurate ration balancing
- have the rations balanced frequently and whenever a change occurs
- group cows based on production and nutritional needs
- test for Total Mixed Ration (TMR) mixing accuracy and ration-delivery accuracy
- reduce dietary phosphorus to current recommended levels
- monitor milk urea nitrogen to detect ration imbalances of protein or energy

These practices have the potential to reduce nutrient excretion of nitrogen and phosphorus by 15-20% on dairy farms. Other strategies such as recycling water can also reduce cost by reducing manure volumes. New strategies and opportunities are often best implemented when expansion plans are first considered. Reductions in nutrient output directly reduce the amount of land necessary for manure application.

The following is intended to provide an overview of the changes occurring on this farm. It also provides a summary of the production implications of the nutrient management plan associated with the expanded dairy operation.

ROSS JOHNSON FARMS

This is a new Nutrient Management Plan Application.

Applicant:

Ross Johnson

Ross Johnson, R. R. #10, Zorra, N0E 1K0
Phone: 519-111-1234 911 Address: 12345

Ross Johnson Farms is a family-owned dairy operation located in Zorra Township in Oxford County. The business is run as a sole proprietorship owned by Ross Johnson. The family plans to expand and build a new free-stall dairy barn. Since manure is generated on only one property and manure is applied to all the land Ross owns, Ross will include all of the land that he owns in his farm unit.

Property Description:

Home Farm: Concession 1, Lot 1, Zorra Township (formerly West Zorra), Oxford County.
911 number 12345. Roll number 111.

Tillable Area: 69.3 ha (171 acres)
Area Available for Manure Application: 67.9 ha (168 acres)
Number of Fields: 3

- Field 1: 20.7 ha (51 acres) tillable; 20.3 ha (50 acres) is available for nutrient application. A 15 m (50 ft) setback from the drilled well on the farm is required.
- Field 2: 20.3 ha (50 acres) tillable; 19.4 ha (48 acres) is available for nutrient application. A creek runs through the back corner of this field. The required setback results in a 0.9 ha (2 acres) area where no manure may be applied.
- Field 3: 28.4 ha (70 acres) tillable; 28.3 ha (70 acres) available for nutrient application.

Manure is generated on this property. Manure and commercial fertilizer are applied to this property.

New Farm: Concession 2, Lot 3, Zorra Township (formerly West Zorra), Oxford County.
911 number 12366. Roll number 222.

Tillable Area: 50.6 ha (125 acres)
Area Available for Manure Application: 49.4 ha (122 acres)
Number of Fields: 2

- Field 1: 24.3 ha (60 acres) tillable; 24.3 ha (60 acres) is available for nutrient application.
- Field 2: 26.3 ha (65 acres) tillable; 25.1 ha (62 acres) available for nutrient application. A creek runs through the front corner of this field. The required setbacks result in 1.2 ha (3 acres) of land where manure may not be applied. Manure and commercial fertilizer are applied to this property.

Implications of the Nutrient Management Plan - A Summary

Simpson Farm: Concession 1, Lot 4, Zorra Township (formerly West Zorra), Oxford County.
911 number 12377. Roll number 333.

Tillable Area: 65.6 ha (162 acres)
Area Available for Manure Application: 64.8 ha (160 acres)
Number of Fields: 3

- Field 1: 21.1 ha (52 acres) tillable; 21.1 ha (52 acres) is available for nutrient application.
- Field 2: 21.9 ha (54 acres) tillable; 21.9 ha (54 acres) available for nutrient application.
- Field 3: 22.7 ha (56 acres) tillable; 21.9 ha (54 acres) available for nutrient application. A pond is located in this field, resulting in 0.8 ha (2 acres) of land where no manure may be applied.

Manure and commercial fertilizer are applied to this property.

Area Summary:

Total Area Owned:	197.2 ha (487 acres)	
Total Tillable Area:	185.5 ha (458 acres)	
Total Area Available for Manure Application:		182.2 ha (450 acres)
Rented:	0 ha (0 acres)	
Manure Agreement:	0 ha (0 acres)	

Barns:

All barns and manure storages are on the Home Farm.
Existing Barns:

tie-stall barn	150 ft. x 60 ft.; converted to dry cows and heifers
bedded pack dimensions	150 ft. x 30ft. x 2.5 ft.
free-stall barn	116 ft. x 92 ft.; 4 row tail-to-tail; washwater added to manure tank

Proposed Barns:

new free-stall barn	260 ft. x 94 ft.
tie-stall barn	150 ft. x 60 ft.; converted to calves and heifers
bedded pack dimensions	116 ft. x 62ft. x 2.5 ft.
free-stall barn	116 ft. x 92 ft.; converted to dry cows and heifers

Manure Storage:

Existing:	110 ft. x 12 ft.; open top circular concrete tank
	100 ft. x 8 ft. x 8 ft.; collection/transfer tank in old free-stall barn; solid manure stored in place in bedded pack
Proposed:	150 ft. x 12 ft.; open top circular metal tank

Combination of existing and proposed storage provides 245 days of permanent manure storage.

Livestock:

Existing:	100 Holstein milk cows plus replacements
Proposed:	200 Holstein milk cows plus replacements

Cropping:

All lands will be in a 1 year of corn, 1 year of winter wheat and 3 years of alfalfa hay and haylage rotation. The Regulation requires that all fields be sampled as part of preparing the NMP (see S.91 of the Regulation for sampling requirements for the first plan - sample required to prepare second plan) and that the samples be analyzed by an OMAF accredited laboratory. A good soil-sampling program monitors soil nutrient levels and prevents over application of nutrients. Appendix C indicates the soil lab test results for this operation. The Sampling and Analysis Protocol requires one test per every 10 ha (25 acres) when initially assessing the existing fertility of a field.

Verification of actual crop yields is important as the amount of manure that may be applied is partially controlled by the actual yield achieved on a per field basis. Crop rotation records should be maintained, as different crops will result in different rates of manure application.

Manure Application and Analysis:

Since the farm unit has 300 NU or more there must a manure sample for each time there is a new NMP. However more regular manure analyses are recommended. A good representative sample will allow for the correct nutrient credits to be used for maximum crop growth and prevent over-application of manure and/or commercial fertilizer. Manure application on this operation will be by drag-hose and rear-discharge spreader. The NMP will detail the volume and timing of manure applications that may be applied to each field.

Spreading Restrictions:

Establishment and maintenance of a vegetated buffer zone or setback along open ditch and creek areas to prevent manure and soil from entering these sensitive areas is a best management practice and a requirement under the Regulation. There are two creeks that run through this farm property. One is on the Home Farm and the other creek is on the New Farm. As set out in the NMP, specific setbacks must be maintained along these watercourses. The size of the setback depends on the field slope beside the watercourse, the soil P concentrations and the method of manure application proposed.

A vegetated buffer zone of a minimum of 3 m (10 ft.) must be established next to the creeks as they would be classified as surface water. Within the remainder of the setback areas, Ross will not spread any manure. Establishment and maintenance of appropriate setbacks to wells is also a best management practice and requirement under the Regulation. A drilled well exists on the Home Farm near field 1. No manure (or other agricultural source materials) may be applied within 15 m (50 ft.) of this well.

Spreading restrictions associated with this plan are illustrated in Appendix B.

MDSII:

To satisfy municipal requirements, the new barn must be kept a minimum of 230.9 m (757 ft.) from the nearest neighbour's dwelling. The proposed site for the barn can meet all required MDSII requirements. The MDSII distance is illustrated in Appendix B.

Contingency Plan:

Even with the best planning, circumstances can change, requiring you to alter how you store, apply and handle your manure. A good contingency plan will be useful in emergencies.

A sample contingency plan for this operation can be found in Appendix D.

Conclusion

The Regulation requires farmers wanting to expand their existing operation or to build a new livestock barn that contains nutrient storage to meet new permit and plan requirements. Know what is required under the Regulation. Getting all the facts ahead of time can help prevent costly and unnecessary delays.

Farmers should have a thorough understanding of the NMS/P to implement their plan and maximize the agronomic and economic value of their manure. Regardless of who completes the NMS/P, the farm operator is responsible for implementation of the plan and monitoring of all activity regulated under the plan.

Appendices - Introduction

A selection of the most common forms that are part of a NMS/P are included in the Appendices. Appendices A and B are concept sketches of a Farm Unit Sketch and a Field Sketch. The sketches do not show all of the details that may be required for an approved sketch. Specific details required in a sketch can be found in the Nutrient Management Regulation 267/03, as amended, and the associated Nutrient Management Protocol, Parts 5 and 7. These items are also available at www.omaf.gov.on.ca. The following chart (Farmstead or Field Sketch Requirements) lists the items that may or may not be needed to complete the sketches.

The following items may or may not be needed as part of your Farmstead or Field Sketches. Refer to Regulation 267/03, as amended, and the associated Protocols to determine your sketch requirements.

Farmstead Sketch

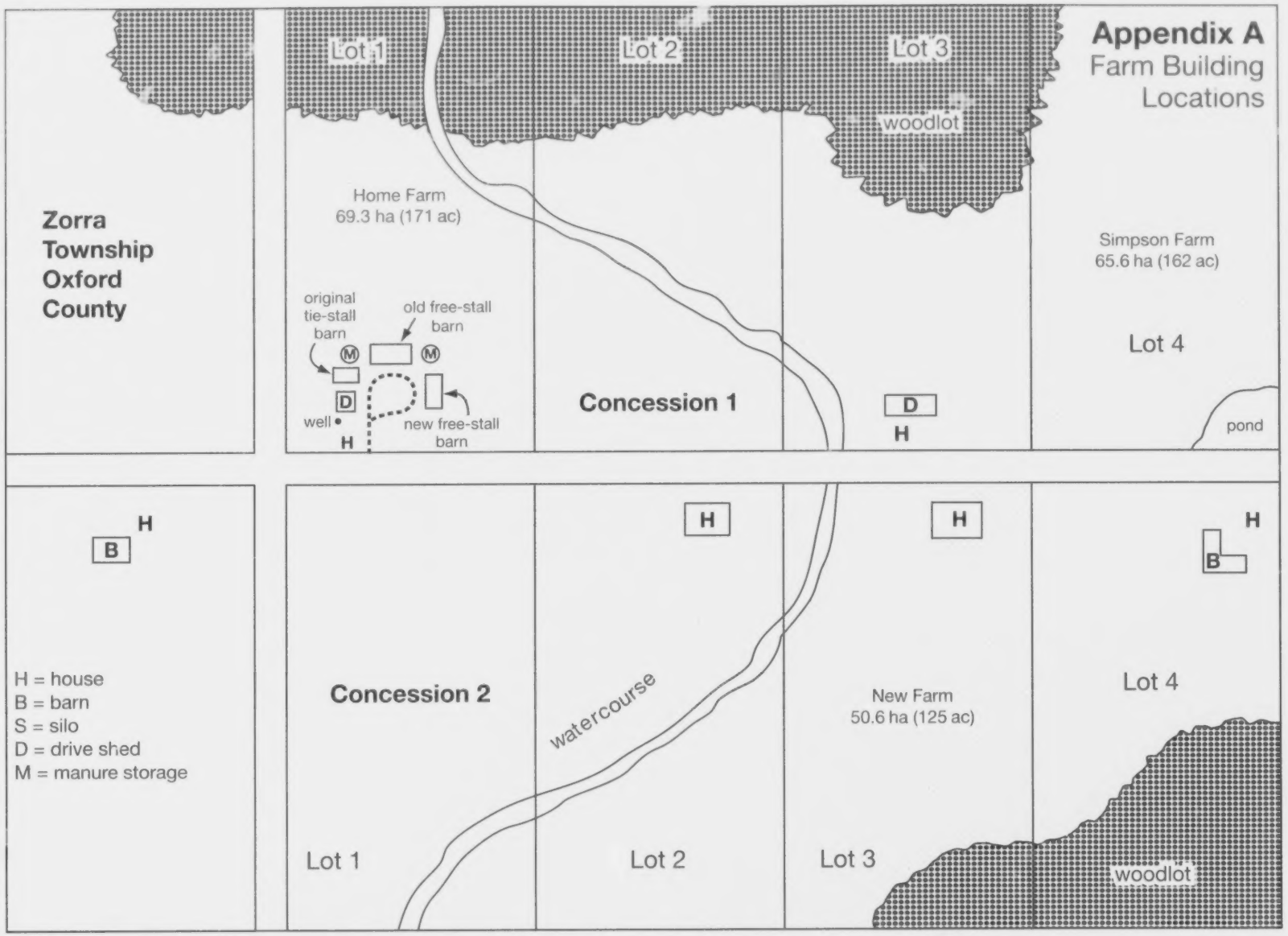
1. North direction arrow
2. Property identifier
3. Label whether the land is owned, controlled (rented or leased) or if there is an application agreement
4. Road names, municipal boundaries, neighbours and other local features
5. Permanent, temporary and proposed generating facilities
6. Permanent, temporary and proposed generating facilities and sites
7. Dimensions of all generating and storage facilities and sites
8. Distance between facilities and lot lines
9. Location of flow paths and physical barriers*
10. Location of wells (includes gas, oil, test and water wells)
11. Location of municipal wells
12. Location of tile inlets
13. Location of surface water
14. Location of other non-agricultural land uses

** Including these items as part of a sketch may facilitate the approval of your application by providing details required as part of compliance with Regulation 267/03, as amended.*

Field Sketch

1. Field identifier (from Farm Unit declaration)
2. Section within a field that has more than one section
3. Identify whether tile drains exist
4. Location of tile inlets*
5. Location of tile outlets*
6. Location of surface water within 150 metres (492 ft.) of the field*
7. Location of non-agricultural land uses
8. Location of municipal wells within 100 metres (328 ft.) of a field boundary
9. Location of all other known wells within 90 metres (295 ft.) of the field boundary if the field is receiving biosolids
10. Location of all other known wells within 30 metres (98 ft.) of the field boundary if the field is only receiving agricultural source material
11. Setback distances required from all wells*
12. Minimum depth to saturated soil conditions
13. Maximum sustained field slope*
14. Maximum sustained field slopes within 150 metres (492 ft.) of the top of the bank of all surface water
15. Setback distances required from surface water established by the minimum separation distance and/or the phosphorus index
16. Location of all permanently vegetated buffer zones*

** Including these items as part of a sketch may facilitate the approval of your application by providing details required as part of compliance with Regulation 267/03, as amended.*



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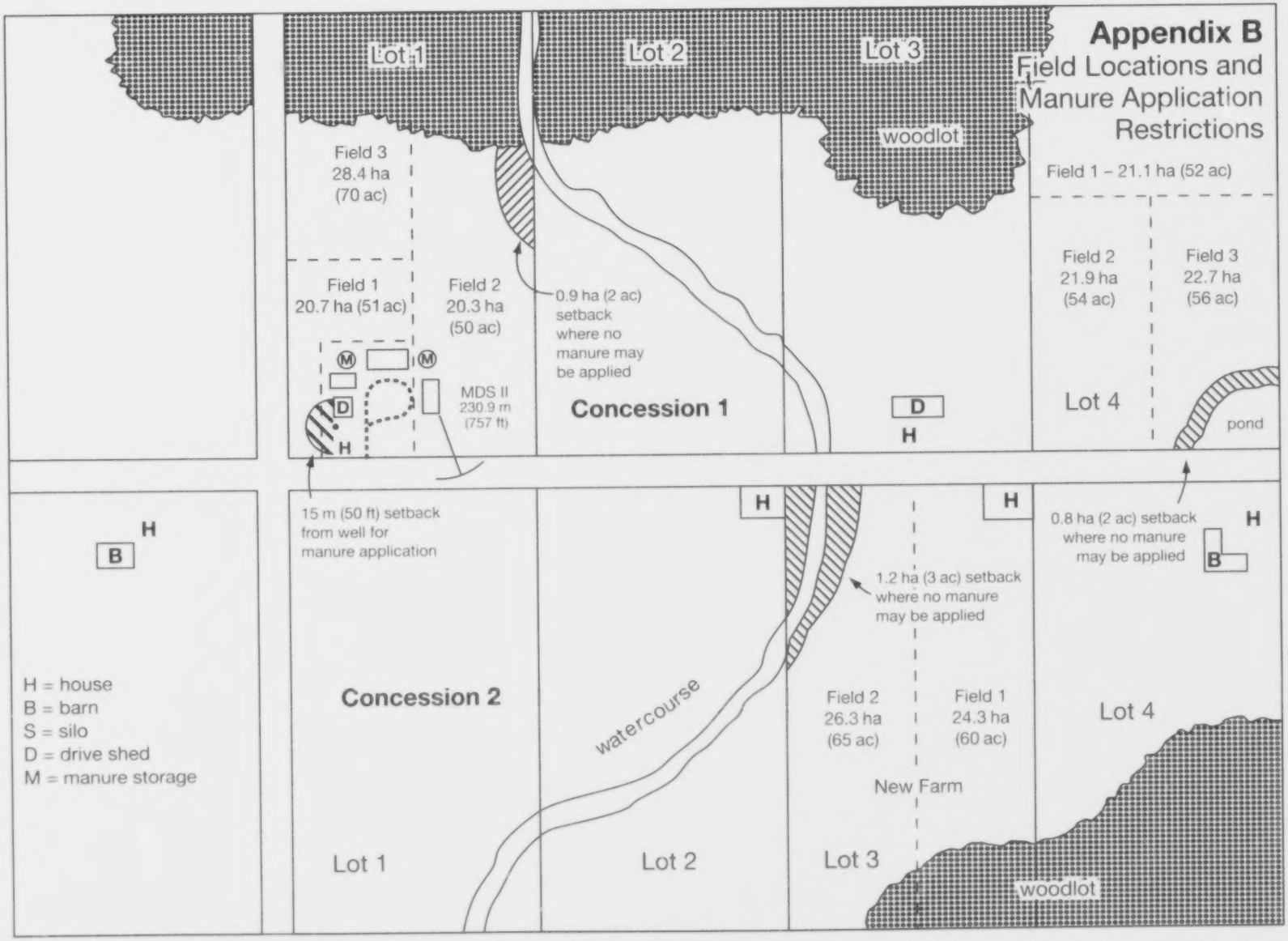

Appendices A and B are concept sketches of a Farm Unit Sketch and a Field Sketch. The sketches do not show all of the details which may be required for an approved sketch. Specific details required in a sketch can be found in the Nutrient Management Regulation 267/03, as amended and the associated Nutrient Management Protocol, Parts 5 and 7. These items are available at www.omaf.gov.on.ca.

Soil-Ag
Lab Services
(An OMAF Accredited Lab)

Unit A - 10 Dirt Street
HOMETOWN, Ontario A0A 0A0

Soil Test Report

Date Submitted: May 20, 2004.
Report Date: April 1, 2004.

Customer	Sample ID	Lab#	pH	BpH	Organic Matter %	NO_3-N (ppm)	$NaHCO_3$ Test Phosphorus (ppm)	Potassium (K) (ppm)	Magnesium (ppm)	Calcium (ppm)
JohnsonHome-F1		574	7.2		3.3		43	199	112	
JohnsonHome-F1		575	6.8		3.4		47	200	135	
JohnsonHome-F2		576	6.9		3.4		41	202	122	
JohnsonHome-F2		577	7.1		3.4		48	198	132	
JohnsonHome-F2		578	7.2		3.3		43	197	128	
JohnsonHome-F3		579	7.2		3.3		43	199	112	
JohnsonHome-F3		580	6.8		3.4		47	200	135	
Johnson New-F1		581	6.9		3.2		21	201	127	
Johnson New-F1		582	7.4		2.4		20	178	142	
Johnson New-F1		583	7.1		3.0		19	200	147	
Johnson New-F2		584	7.2		2.9		22	190	149	
Johnson New-F2		585	7.0		3.1		14	192	130	
Johnson New-F2		586	7.0		3.5		26	210	142	

Soil-Ag
Lab Services
(An OMAF Accredited Lab)

Unit A - 10 Dirt Street
HOMETOWN, Ontario A0A 0A0

Soil Test Report

Date Submitted: May 20, 2004.
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Customer	Sample ID	Lab#	pH	BpH	Organic Matter %	NO_3-N (ppm)	$NaHCO_3$ Test Phosphorus (ppm)	Potassium (K) (ppm)	Magnesium (ppm)	Calcium (ppm)
Johnson	Home-F1	574	7.2		3.3		43	199	112	
Johnson	Home-F1	575	6.8		3.4		47	200	135	
Johnson	Sim-F1	587	7.2		3.3		18	199	112	
Johnson	Sim-F1	588	6.8		3.0		22	200	127	
Johnson	Sim-F1	589	7.5		2.6		25	214	122	
Johnson	Sim-F2	590	7.1		2.8		27	212	118	
Johnson	Sim-F2	591	7.2		3.3		19	219	112	
Johnson	Sim-F2	592	7.4		3.0		22	200	124	
Johnson	Sim-F3	593	7.4		2.9		26	179	127	
Johnson	Sim-F3	594	6.9		3.1		28	191	119	
Johnson	Sim-F3	595	7.2		3.0		27	186	122	

Appendix D - Manure Contingency Plan (Sample) - Ross Johnson Farms 2004

EMERGENCY CONTACT TELEPHONE NUMBERS:

Spills Action Centre		1-800-268-6060
Ministry of the Environment (Local Office)		1-222-333-4444
Backhoe Operator	Excavations Inc.	1-222-333-4444
Dump Truck Operator	Dumptrucks Ltd.	1-222-333-4444

ON-SITE EMERGENCY EQUIPMENT

Solid manure spreader
Tractor
Skidsteer loader

This contingency plan sets out possible actions that can be taken in the event that this Nutrient Management Strategy and Plan cannot be followed.

STORAGE:

Liquid Runoff From Storage Facility

- This facility should be periodically monitored to ensure that no liquids are escaping the storage facility.
- Liquids in the storage facility could be removed with a vacuum tank and, if conditions will allow, field applied or transferred to a proper storage facility.
- A berm may be constructed to prevent liquids from migrating into surface waterways.

WEATHER OR EQUIPMENT CONDITIONS IMPEDING PLANNED STORAGE OR APPLICATION

Manure Application Change

- When the timing of a manure application must be changed, adjust the nutrient amounts to reflect the change in application timing.
- In making such changes, you must not exceed the maximum annual nutrient application rate or the maximum rate per application.
- The application rate must comply with the requirements of the Regulation.
- Adjust subsequent applications of nutrients to accommodate the change in timing of the nutrient application and record the change in your NMP.

Crop Change

- Nutrient amounts and formulation should be adjusted (where possible) to account for a change in designated crop.
- If the nutrients have already been applied, the amount and formulation should be adjusted for the next crop to be grown, where possible, to account for the previous crop change.

Commercial Fertilizer Material or Analysis Change

- Where the nutrient composition that is listed in the NMP is altered, the altered material or analysis should be reflected in the NMAN plan.
- Subsequent nutrient applications should reflect these changes to the original NMP.

MORE NUTRIENT THAN THE STORAGE DESIGN CAPACITY

In some cases, generally due to adverse weather conditions, the storage may not be sufficient to store all manure produced.

To overcome this problem, the preferred solution would be to land-apply the manure where doing so will not result in an adverse effect.

Options

- Alter your Nutrient Management Plan if the application rates are not already at the maximum and renew if required by the Regulation.
- Transfer the nutrient to an available storage facility with excess capacity (a Nutrient Transfer Agreement may be required).
- Work with your broker to take the excess.
- Obtain access to more land through ownership or by means of an Application Agreement or land rental.
- Transfer to a non-regulated farm, and document.
- Utilize temporary in-field storage.
- Use in-barn storage between crop clean outs to extend the capacity of the storage.

TO AVOID A SPILL YOU SHOULD:

- Calibrate your manure application equipment to apply at rates indicated in your NMP.
- Avoid spreading solid manure closer to a watercourse than indicated by your NMP.
- Do not apply manure on steep slopes and avoid spreading on snow or prior to rainfall.
- Do not apply manure within 30 m (100 ft.) of a dug well or within 15 m (50 ft.) of a drilled well.

IF A SPILL DOES OCCUR

- Immediately shut down cause of spill.
- Contain the material to minimize opportunity for material to move off site.
- Notify the Spills Action Centre.
- Clean up the spill and land apply the material in accordance with the Nutrient Management Plan or return the material to storage.
- Re-evaluate manure handling procedures and the effectiveness of the contingency plan.

Ontario

15.1a Farm Unit Declaration Form When NMAN Software is Used to Complete Nutrient Management Strategy and Plan

A: General Information

- A Farm Unit as defined by the *Nutrient Management Act, 2002 Ontario Regulation 267/03* is the basis for a Nutrient Management Strategy and/or Nutrient Management Plan.
- For each Farm Unit there is only one Nutrient Management Strategy and one Nutrient Management Plan.
- The Farm Unit must include all land on the property where the nutrients are generated.
- The Farm Unit can include other properties.

B: Contact Information

Displayed in Page 1 or 2 of the Nutrient Management Approval generated by NMAN and dated _____.

Operation Identifier (if previously assigned by Ministry):_____

C: Location of all the Generating and Storage Facilities that are part of this Farm Unit

Displayed in Page 1 or 2 of the MSTOR Printout generated by NMAN and dated_____.

D: Location and Identification of Land that is part of this Farm Unit.

Displayed in Page 1, 2 and/or 3 of the NMAN Application for Nutrient Management Approval generated by NMAN and dated_____.

E: Declaration

I, _____ (farm unit operator or authorized agent) declare that the facilities and property referred to on this form comprise the entirety of this Farm Unit. I acknowledge the requirement to complete a nutrient management plan and/or strategy, and that such nutrient management strategy and/or plan shall include all of the lands identified on this form.

I hereby warrant that the information contained on this form is true, and that I have authority to complete this document.

Indicate whether the operation that this farm unit is in, is either

☐ Corporation, Name:

☐ Division of a Corporation, Name:

☐ Partnership, Names and addresses of Partners:

☐ Sole Proprietorship, Name and address of owner:

Farm Unit Operator/ Authorized Agent (print)	Signature	Date
Witness (print)	Signature	Date

Ontario

15.2 Nutrient Management Strategy or Plan Sign-off form

Contact Information:

Name of Operator:	
Address:	
Telephone:	
Operation Identifier (if previously assigned by Ministry):	

Notice of Collection:

Personal information provided in the application is collected under the authority of the *Nutrient Management Act, 2002, Ontario Regulation 267/03 s. 4.1(1)*. It will be used for the review, approval, enforcement and audit of the strategy or plan, as the case may be. The information may be made available to external experts contracted by OMAF for advice during review and approval or to Ministry of the Environment for advice during review and approval or for enforcement purposes. A public record of approved plans may be made available to the public by publication in print or over the World Wide Web. Data from plans and strategies may be aggregated without personal identifiers and made available to researchers for evaluation of the program and other matters related to nutrient and environmental management that may be in the public interest. Questions about this collection should be directed to:

Manager, Approvals,
Nutrient Management Branch,
Ministry of Agriculture and Food,
1 Stone Road West, 3rd Floor NW
Guelph, ON N1G 3S4
Phone: 519-826-6368

Provision of False Information in this Application:

Any false or misleading information submitted by the applicant in this document may result in the invalidation of any approvals or permits granted, and prosecution in accordance to the provisions of the *Nutrient Management Act, 2002*.

Appendix F - Nutrient Management Strategy or Plan Certification Form

Ontario

Declaration:

Applicant declaration

I, _____[the applicant (farm unit operator or authorized agent)], certify

a. to the best of my knowledge, excluding unforeseen or uncontrollable circumstances, the information contained in this application dated _____ provides an accurate description of the existing and proposed operation over the time period covered by this plan or strategy.
b. that I understand that in the course of the administration of the Act, the ministry may provide the information contained in this application to external agents for review and analysis, and authorize the ministry to provide this information to its external agents, and authorize its external agents to collect this information from the ministry

and

I, _____ [the applicant],

☐ authorize OR

☐ do not authorize

[the individual who prepared this plan] _____to act as my agent for the purposes of obtaining approval for this application, and may provide the ministry, or its agents, any information required in the review of this application.

Name (print) Signature Date

Declaration of Individual who prepared the plan

I, _____ [the individual who prepared this plan], hereby certify that based on relevant information provided in good faith and excluding unforeseen or uncontrollable circumstances, the recommendations contained in this application dated _____will, if implemented, result in acceptable management practices in accordance to the regulation and protocols under the *Nutrient Management Act, 2002*.

Name (print) Signature Date

Special thanks to all those who have contributed to this publication by lending their expertise and resources.

Contributing Writers: Harold House, Brian Lang, Kevin McKague, Michael Payne, Jack Rodenburg, Ontario Ministry of Agriculture and Food; Tom Wright, Consultant and Franklin Kains, Consultant.

Technical Review: Dale McCombe, Richard Brunke and Shawn Burr, Ontario Ministry of Agriculture and Food and Wayne Currah, TRILLIUM Agronomics.

Editorial Coordinator: Arlene Robertson and Betty Summerhayes, Ontario Ministry of Agriculture and Food.

To Obtain More Information:
A listing of other publications related to the *Nutrient Management Act*, 2002 and course information can be obtained from the OMAF website at www.omaf.gov.on.ca or by calling the Nutrient Management Information Line at 1-866-242-4460.

For information or to obtain copies of this or any other ministry publication, please call 1-888-466-2372 from within Ontario or OMAF's TTY line at (519) 826-7402 for the hearing impaired; e-mail your requests to products@omaf.gov.on.ca or visit the OMAF website at www.omaf.gov.on.ca. Orders can be faxed to (519) 826-3633 or mailed to Government Information Centre, OMAF, 1 Stone Road West, Guelph, ON N1G 4Y2.

DISCLAIMER:
This publication reflects the opinions of the contributing writers and is based on the information available as of the date of publication. It is based on a fictional property and fictional situation. It should not be regarded as an exact model for a Nutrient Management Plan. This publication may be updated as required.

Notes

Notes

Contact OMAF for more information:

Nutrient Management Information Line:
1-866-242-4460

E-mail:
nman@omaf.gov.on.ca

Web site:
www.omaf.gov.on.ca

ISBN: 0-7794-6062-6
©Queen's Printer for Ontario, 2005
01-05-4M

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Ontario